English translation of Cited Reference 1, Korean Laid-Open Patent Publication No. 2000-71228 (published on June 3, 2002) in the name of Hynix Semiconductor Inc.

An object of the present invention is to resolve the time delay generated when using a single linked list in a conventional synchronizing IMT-2000 system by substituting the single linked list for a double linked list and to reduce a load that may be caused due to the related information transmission during start-up by allowing a control station to manage information regarding all mobile channels of a base station.

Further, another object of the present invention is to provide a resource management method using a double linked list structure at a non-synchronizing IMT-2000 control station so as to reduce continuous errors that may be generated due to a serial channel numbering for one resource by changing a numbering scheme for mobile resources.

In order to achieve the above objects, a resource managing method using a double linked list structure at the non-synchronizing IMT-2000 control station according to the present invention comprises:

a channel initialization process for receiving initial data including a shape information from a database, initializing array information for storing the channel information and then constituting the double linked list by using currently service-available resources;

a channel allocation process for receiving a request for allocating wire/wireless resources from a Core Network (hereinafter, "CN"), obtaining resource information indicated by a status pointer within a shared memory, changing said obtained status of resource and deleting corresponding node selected by the linked list, moving said status pointer to the next node and then transmitting the channel allocation information to the corresponding base station; and

a channel canceling process for receiving a request for canceling the wire/wireless resources from said CN, obtaining a channel ID using a corresponding Call_ID, changing the status of said corresponding resource to idle status, adding the corresponding resource to the linked list and transmitting the channel cancellation information to the corresponding base station.

Hereinafter, a preferred embodiment of resource management method in the non-synchronizing IMT-2000 system control station of the present invention according to the above-mentioned technical concept will be explained in detail with reference to the attached drawings.

FIG. 3 shows a relation between a resource management block and a function block related thereto in the control station using the double linked list according to the present invention.

As shown in FIG. 3, the control station 2000 has wire/wireless resource information regarding the control station 2000 or the base station 1000 stored on a shared memory unit 2030. A resource management block provides an access to each of applications (2011~2010 + n) as a form of a common library unit and provides mutual exclusive management

functions by using the Semaphore (a variable used for the synchronization between tasks or the mutual control in a multitask Operating System) provided by the system. Namely, it provides a function of ordering several processes so that only one process thereof may perform the changing work of the data at a certain moment.

FIG. 4 shows the structure of the entire double linked list constructed within the shared memory according to the present invention.

As shown in FIG. 4, a call control block constitutes the double linked list by using the shared library when initiating the application after starting-up of the system and then rapidly obtains the information regarding the idle channel by also using the shared library during the wire/wireless resource allocation and the current pointer at the double linked list within the shared memory. Thereafter, the information regarding the corresponding channel is deleted from the above constituted list and thus, only the information regarding currently available channel can be maintained inside the double linked list.

At this time, the base station is constructed to receive information regarding the channel to be occupied by it from the control station and to occupy only the corresponding channel, without providing the base station with a resource management function regarding separate channels.

Further, when canceling the channel, in contrast to the above-mentioned case, the information regarding channel to be returned is changed to an idle status and the idle status is added to the double linked list by using the shared library in the call control block and using the channel element ID as a key.

And, the above-mentioned numbering scheme is identically applied to a channel card resource that is a wireless channel as well as a selector within the control station. Such numbering scheme is schematically illustrated in FIG. 5.

FIG. 5 illustrates the numbering scheme of the channel card according to FIG. 4.

First, the control station system basically reads the information regarding resources of the control station from the database during start-up, allocates array using the entire allocable channel element ID as key and constitutes the double linked list using the available resources.

At this time, the channel element ID is sequentially allocated per each channel card. In other words, the first channel in channel card 0 is numbered as 'channel element ID=0,' the first channel in the channel card '1' is numbered as '1' and the first channel in the final channel card 'n' is numbered as 'n,' and then, from the next channel, the channel is numbered from the channel card '0' in order. Thereby, it is possible to prevent any generation of uncompleted call due to the continuous resource allocation when a service using the corresponding resource becomes impossible due to the defect of the software element in a specific channel card.

FIG. 6 is a flow chart showing the flow of the process of the channel management method using the double linked list in the channel management unit in accordance with the present invention.

As shown in FIG. 6, the function of the entire channel management unit may be divided into three processes, that is, a channel initiation process S100, a channel allocation process S200 and a channel cancellation process S300.

First, the channel initiation process S100 comprises the step (ST11) of receiving the initial data including shape information from the database, the step (ST12) of initiating array information for storing the channel information after receiving the data and the step (ST13) of constituting the double linked list using currently service-available resources.

Second, the channel allocation process S200 comprises the step (ST14) of receiving the wire/wireless resource allocation request from the CN after constituting said double linked list, the step (ST 15) of obtaining the resource information indicated by a status pointer within a shared memory after receiving said requesting step, the step (ST16) of changing the status of said obtained corresponding resource to a Busy Status, the step (ST17) of deleting the corresponding node selected by the linked list after said changing step, the step (ST18) of moving the status pointer to the next node after said node deleting step and the step (ST19) of transmitting the channel allocation information to the corresponding base station after said moving step.

Third, the channel cancellation process S300 comprises the step (ST20) of receiving the wire/wireless resource cancellation request from the CN after said channel allocation information transmission step, the step (ST21) of obtaining the channel ID using the corresponding call ID, the step (ST22) of changing the status of the corresponding resource into idle status after obtaining said channel ID, the step (ST23) of adding the corresponding resource to the linked list after said status change and the step (ST24) for transmitting the channel cancellation information to the corresponding base station after adding said resource to said list.

The operation of the resource management method according to the present invention constituted as mentioned in the foregoing will be explained below.

First, in the channel initiation step S100, when starting-up the control station system, the call control block constitutes, using the shared library, the double linked list regarding currently available wire/wireless resources within the control station and base station into the shared memory. At this time, a status pointer is designated to indicate the resource to be allocated in the next time, and a header pointer is designated to indicate a first resource.

In the channel allocation process S200, the call process procedure is performed by receiving a request for a signaling call from the user equipment (hereinafter, "UE") and a request for a destination call from the CN. At this time, during the allocation of the resource, the call control block, using the shared library, brings information regarding the resource indicated by the current pointer in the double linked list within the shared memory. Thereafter, the

current pointer is moved to the next pointer and the information regarding the allocated resource is changed into the busy status and is deleted from the double linked list so that only the information regarding currently available idle channel is always maintained in the list.

In the channel cancellation process S300, when canceling the occupied resource by a truncation from the UE or a call cancellation from the CN, the call control block, using the shared library as in the above-mentioned channel allocation process, identifies the node having the same value of channel ID based on the channel element ID being mapped with the Call_ID transmitted from said CN, changes the corresponding channel information to idle status in contrast to the case of the above channel allocation process and adds the changed channel information into the double linked list so that the corresponding resource becomes re-available status.

In addition, resource status management block or the call control block for maintenance are constructed to identify the status information discordance of the double linked list information on the shared memory by using the shared library provided in the system.

Therefore, it is possible to identify and correct the resources included in the double linked list but service-unavailable under the current status, the resources in the busy status but under service-available status or the resources under service-unavailable status.

According to the present invention disclosing a resource management method in non-synchronization IMT-2000 control station, by using the double linked list structure when the non-synchronization IMT-2000 base/control station receives a channel allocation/cancellation request from the call process control unit during the call process, unnecessary searching work may be avoided and the process may be more rapidly processed compared to the single linked list, and thus, the problems occurred by the process time delay may be prevented in advance.

Further, when the service using the corresponding resource becomes impossible due to the generation of the defects of the software element in a specific channel card, the generation of the uncompleted call due to the continuous resource allocation may be prevented.

Still further, there are advantages in that continuous errors due to the disorder generated in the specific channel card may be prevented by equally numbering each of channel cards and the consistency of the resource management may be protected by receiving information for the separate channel allocation and cancellation during the channel allocation process in the control station without any transmission of the information during the start-up of the base station system.